Claims

What is claimed is:

1. A railway track strength measurement system comprising:

an axle assembly having a first wheel and a second wheel, the wheels positioned to ride on railway track;

a first axle half connected to the first wheel and a second axle half connected to the second wheel;

the first and second axle halves being interconnected by an expansion device, the expansion device adapted to increase and decrease the distance between the first and second wheels and places a lateral load on the axle halves and track; and

the axle halves each including force sensors adapted to measure changes in lateral forces in the axle halves.

2. The railway track strength measurement system of claim 1, wherein the compression device includes a hydraulic ram connected to the first axle half at a first end and to the second axle half at a second end.

3. The railway track strength measurement system of claim 1 wherein the first and second axle halves are fixed and do not rotate with respect to the first and second wheels.

4. The railway track strength measurement system of claim 1, wherein said first axle half includes a load measurement region.

5. The railway track strength measurement system of claim 4, wherein the load measurement region is formed to define two opposed vertical recesses, with a solid portion positioned between the two recesses.

6. The railway track strength measurement system of claim 5, wherein the solid portion includes two apertures adapted to receive load cells.

7. The railway track strength measurement system of claim 6, wherein one of the load cells are positioned within the apertures to detect lateral forces with the axle halves.

8. The railway track strength measurement system of claim 1, wherein the first and second axle halves are connected to a pair of hydraulic cylinders, the hydraulic cylinders positioned to place a vertical load on the axle halves.

9. The railway track strength measurement system of claim 8, wherein the axle halves each include force sensors adapted to measure changes in vertical forces in the axle halves.

10. A method for measuring track strength comprising the steps of:

positioning a track strength measuring device on a pair of railway rails, the rail strength measuring device having a pair of adjustable axle halves positioned between a pair of wheels;

placing the pair of axles under a substantially constant lateral load;

measuring force in a given region in each of the axle halves;

recording force from the given region in each of the axle halves;

measuring changes in track gauge from an unloaded to a loaded state; and

determining, based on changes in track gauge from an unloaded to a loaded state in combination with known loading forces, whether portions of the track are in need of repair.

11. The method for measuring track strength of claim 10, further including the step of comparing the measured track gauge under load to known standard values.

12. The method for measuring track strength of claim 11, further including the step of repairing the section of track that does not meet the known standard values.

13. A railway track strength measurement system comprising:

an axle assembly having a first wheel and a second wheel, the wheels adapted to ride on railway rails;

a first axle half connected to the first wheel and a second axle half connected to the second wheel;

the first and second axle halves being interconnected by a first hydraulic cylinder, the hydraulic cylinder adapted to place a lateral force on the axle halves;

the first axle half have being connected to a second hydraulic cylinder the second hydraulic cylinder adapted to place a vertical force on the first axle half;

the second axle half being connected to a third hydraulic cylinder, the third hydraulic cylinder adapted to place a vertical force on the second axle half;

the first and second axle halves each including load sensors adapted to measure changes in vertical and lateral forces within the first and second axle halves.

14. The railway track strength measurement system of claim 13 wherein the first and second axle halves are fixed and do not rotate with respect to the first and second wheels.

15. An axle continuous lateral and vertical force control system comprising:

first and a second axle halves each having a wheel, the wheels adapted to ride upon railway tracks;

each of the axles including force sensors adapted to measure lateral and vertical load on the axles;

a first hydraulic cylinder adapted to exert a lateral force on the axles, causing a lateral force to be applied to the railway tracks;

a second hydraulic cylinder adapted to exert a vertical force on the axles, causing a vertical force to be applied to the railway tracks;

a controller adapted to receive signals from the force sensors and adapted to react to variations in signals by making computations as to the force needed to counteract the variations in signals;

a hydraulic servo valve system adapted to receive signals from the controller and independently pressurize the hydraulic cylinders at a first end to independently decrease lateral or vertical load on the axles or to pressurize the hydraulic cylinders at a second end to independently increase lateral or vertical load on the axles, in response to variations in signals from the force sensors.

16. A method for monitoring track strength comprising the steps of:

receiving analog signals from force sensors positioned on axle half shafts of a rail strength measuring axle;

boosting the analog signals from the force sensors;

converting the analog signals from the force sensors to digital values;

calculating lateral and vertical load values based on the digital values;

providing a graphical display of the lateral and vertical load value data points; and

displaying the limits of permissible deviation of values from an envelope of acceptable force.

17. A load axle calibration system for calibrating a track strength monitoring vehicle wherein the vehicle includes an axle with first and second wheels, the axle having first and second axle shafts equipped with axle force sensors, the load axle calibration system comprising:

a transfer standard cell adapted to measure lateral force in the axle;

a harness connected to the axle and adapted to transmit lateral forces to the transfer standard cell from the axle;

a controller adapted to control the force exerted by the axle on the transfer standard cell, the controller adapted to compare the force values of the internal axle force sensors to standardized force values established by the transfer standard cell.

18. A track strength monitoring system for track testing load axle, wherein the axle includes a first and a second wheel comprising:

a first graphical display illustrating data points of vertical and lateral force exerted by the first wheel on railway track as accumulated plots relative to a statistical envelope;

a second graphical display illustrating data points of vertical and lateral force exerted by the second wheel on railway track as accumulated plots relative to a statistical envelope.

19. The track strength monitoring system of claim 18 further including a first histogram illustrating a historic log of the lateral over vertical force ratio of the first wheel;

a second histogram illustrating a historic log of the lateral over vertical force ratio of the second wheel.